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DESCRIPTIONS OF TWO NEW SPECIES OF THE
GENUS *PHYLLONORYCTER* HÜBNER FROM JAPAN AND KOREA,
WITH NOTES ON THE *LONGISPINATA*-GROUP
(LEPIDOPTERA: GRACILLARIIDAE)

By TOSIO KUMATA and KYU-TEK PARK

Abstract

KUMATA, T. and PARK, K.-T. 1978. Descriptions of two new species of the genus *Phyllonorycter* Hübner from Japan and Korea, with notes on the *longispinata*-group (Lepidoptera: Gracillariidae). *Ins. matsum. n. s.* 13: 29-42, 1 tab., 20 figs.

Two new species, *Phyllonorycter kisoensis* (food plant: *Alnus hirsuta*) from Central Honsyû, Japan, and *P. koreana* from Korea, are described. They belong to the species-group of *longispinata*, on which some taxonomic notes are given.

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Contents

Introduction	31
Acknowledgements	31
Descriptions of new species	
<i>Phyllonorycter kisoensis</i> , n. sp.	31
<i>Phyllonorycter koreana</i> , n. sp.	35
Notes on the <i>longispinata</i> -group	38
Key to the species of the <i>longispinata</i> -group	41
Literature	42

INTRODUCTION

In this paper are given descriptions of two new species of the genus *Phyllonorycter* Hübner, 1822 (= *Lithocolletis* Hübner, 1825), one from Central Honsyû, Japan, and the other from Korea. Up to the present, 60 species of the genus are known to occur in Japan, while only one species *P. ringoniella* (Matsumura) is recorded from Korea. The new species from Japan was reared from the larvae mining leaves of *Alnus hirsuta* (Betulaceae). It is very closely related to *P. longispinata* (Kumata), another leaf-miner of *Alnus japonica* and *A. hirsuta* in Japan. The new species from Korea, with food plant unknown, is also related to *longispinata*. These may constitute a species-group together with *P. takagii* (Kumata) and *P. gigas* (Kumata). At the conclusion of this paper, notes on this species-group, with a special reference to the taxonomic relationship among the members, are given.

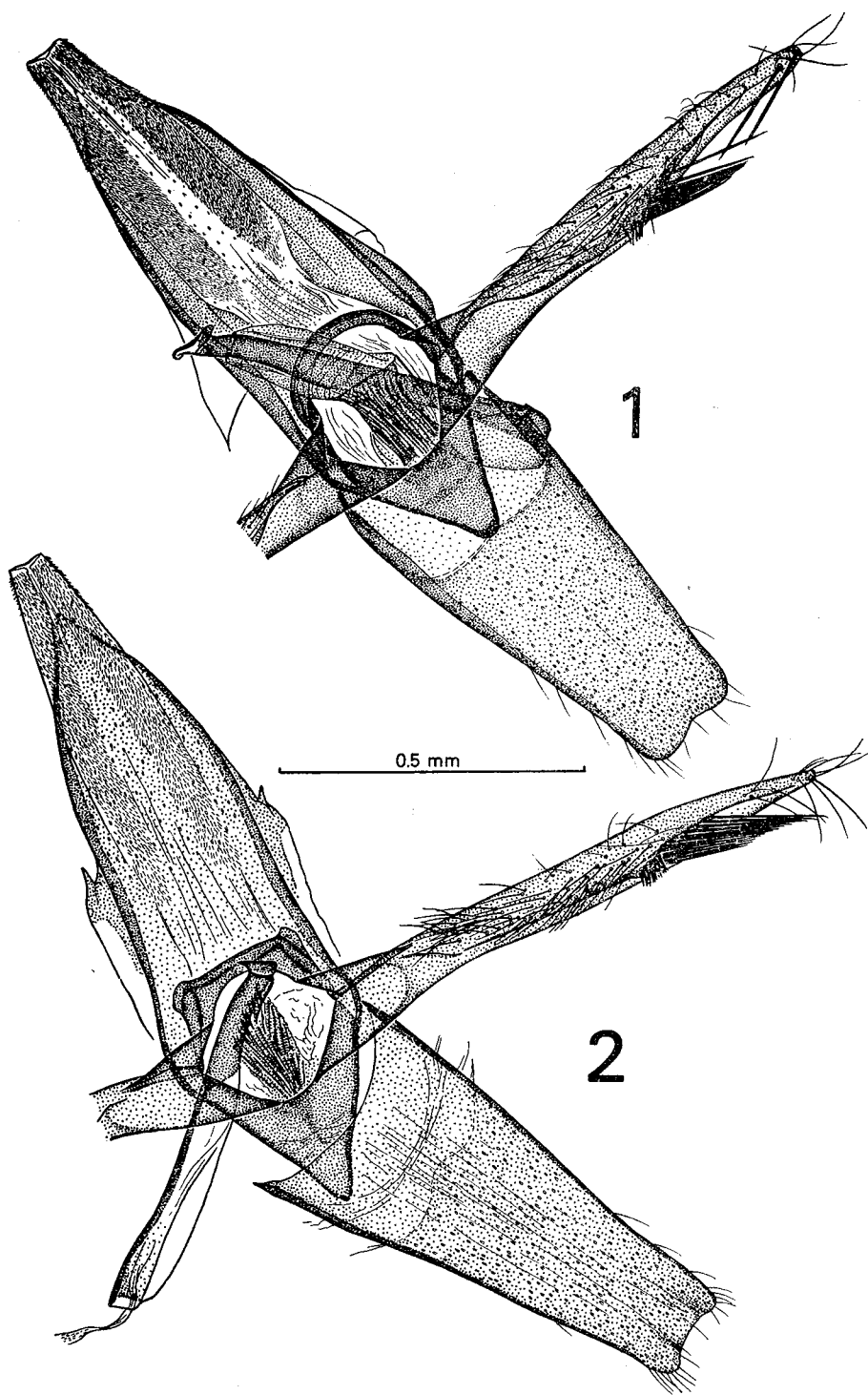
Acknowledgements. One of us (Kumata) wishes to express his cordial thanks to Dr. J. Klimesch and Mr. G. Deschka of Austria for their kindness in offering many European specimens to compare with the present specimens. We also wish to express our special thanks to Prof. S. Takagi of Hokkaidô University for his kindness in reading through this manuscript.

DESCRIPTIONS OF NEW SPECIES

Phyllonorycter kisoensis, n. sp.

♂ ♀. Expanse of wings: 6.2–8.0 mm. (8.0 mm. in holotype and 7.2 mm. in average of 18 specimens). Length of fore wing: 2.8–3.8 mm. (3.8 mm. in holotype and 3.4 mm. in average of 18 specimens).

Colour: Face and palpus shining white; tuft of vertex yellowish-brown, darkened laterally. Antenna brownish-black above, whitish below, with 9 to 10 apical segments whitish wholly; scape white, with a narrow, brownish, longitudinal line above; basal pecten consisting of more than 10 white hairs. Thorax on dorsal surface ochreous-brown, reflected with a golden lustre; a pair of very narrow, white lines along mesial sides of tegulae, sometimes becoming indistinct anteriorly; pleural and ventral surfaces shining white. Legs shining white; fore femur and tibia darkened outside; fore tarsus blackish, with 2 white rings, one at base and the other just before middle; middle tibia slightly darkened outside, the tarsus blackish on its apical half; hind tibia grayish, the tarsus blackish on its basal half. Fore wing lanceolate, golden-brown in ground colour, with markings silvery white; a longitudinal basal streak running in parallel with costa from base to basal 1/3 of wing, narrow, slightly widened apically, surrounded with blackish scales especially thickly on its apical half; a spot placed at basal 1/7 of dorsal margin, semicircular in outline, thickly edged with blackish scales on the side towards base of wing; a transverse premedian band rather narrow, slightly arched outwardly, narrowly edged with blackish scales internally, shading into ground colour outwardly; a dorsal area between the subbasal spot and premedian band widely darkened; 3 costal strigulae arranged nearly equidistantly on costa between the premedian band and apex of wing, internally edged with blackish scales, the first two being perpendicular and wedge-shaped, and the third slightly oblique inwardly and sometimes indicated by blackish marginal scales only; a dorsal strigula placed just basally to tornus,



usually opposed to the first costal strigula, elongate-triangular, slightly oblique outwardly, reaching nearly half breadth of wing, but never touched with opposite costal strigula, edged with blackish scales on entire length of inner side and apical part of outer side; a small whitish spot placed at middle of termen; a blackish, round spot placed at apex of wing; 2 or 3 rows of blackish scales scattered along termen; cilia pale gray, blackish inside fringe-line. Hind wing dark gray; cilia gray. Abdomen fuscous dorsally, silvery-whitish ventrally, with anal area dark brownish.

Male genitalia: Symmetrical. Tegumen long; tuba analis a little produced, covered with dense micro-spines on lateral surfaces. Saccus moderate in length, triangular. Valva straight, slender, slightly swollen at middle, then nearly parallel-sided distally; 2 (rarely 1 or 3) long, thick setae apically; 5 to 10 (7 in average of 5 specimens) similar setae arranged in a longitudinal row medially, with 9 to 12 short, spine-like setae in a clump just basally on ventral side; many fine setae irregularly scattered dorsally on inner face. Transtilla U-shaped or quadrate, slightly lobated on anterolateral corners. Aedoeagus about $\frac{4}{5}$ as long as valva, slender, nearly straight, with an apical barb; juxta weakly sclerotized, striated longitudinally. Ventral flap a little shorter than valva, oblong, slightly narrowed apically, with a shallow incision on apical margin.

Female genitalia: Symmetrical. Papilla analis short; apophysis posterioris long, slightly widened on its posterior half. Eighth abdominal segment with 6 to 8 setae on caudal margin of tergite; apophysis anterioris nearly half as long as apophysis posterioris, slightly widened posteriorly. Genital plate fan-shaped, situated on ventrum of 8th abdominal segment, densely covered with micro-spines. Ductus bursae membranous in entire length, long, slender; corpus bursae globular; signum weakly sclerotized in an elliptical plate, with a pair of cone-shaped projections in the centre. Seventh abdominal segment strongly sclerotized, with an imbricate pattern on entire ventral surface.

Material examined: 5♂♂ & 14♀♀. Holotype: ♂ (G. sl. no. Grc-2026), Ôtaki, Kiso, Nagano-ken, Honsyû, Japan, em. 18/vii/1975, T. Kumata leg., ex *Alnus hirsuta*, breeding no. 1461. Paratypes: 1♂, Siobara, Totigi-ken, Honsyû, em. 26/iv/1976, T. Kumata leg., ex *A. hirsuta*, breeding no. 1670; 1♂, Todai, Ina, Nagano-ken, em. 18/v/1976, T. Kumata leg., ex *A. hirsuta*, breeding no. 1593; 3♀♀, Kaida, Kiso, Nagano-ken, em. 26/iv/1976, T. Kumata leg., ex *A. hirsuta*, breeding no. 1576; 2♂♂ & 10♀♀, Ôtaki, Kiso, em. 24-26/iv/1976, T. Kumata leg., ex *A. hirsuta*, breeding no. 1548; 1♀, with the same data as those for the holotype except date emerged, 23/vii/1975.

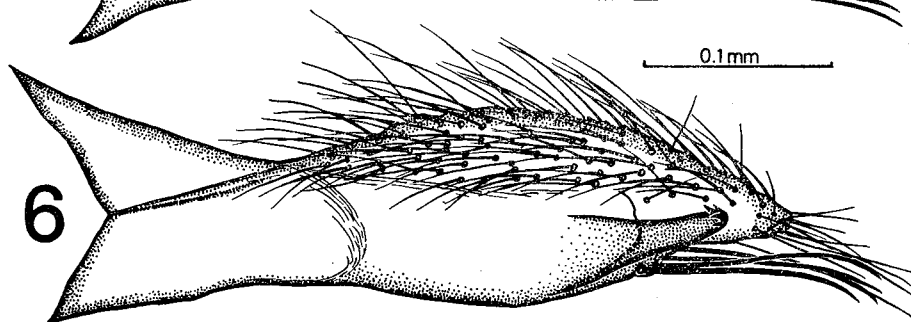
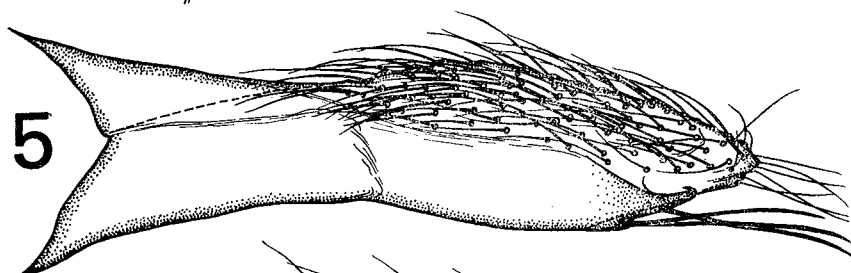
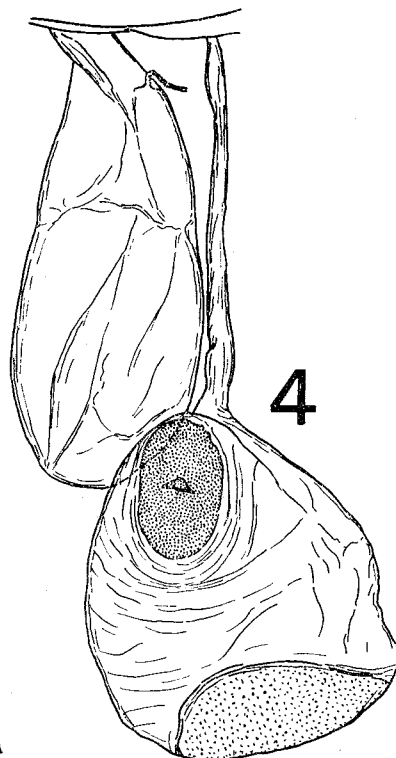
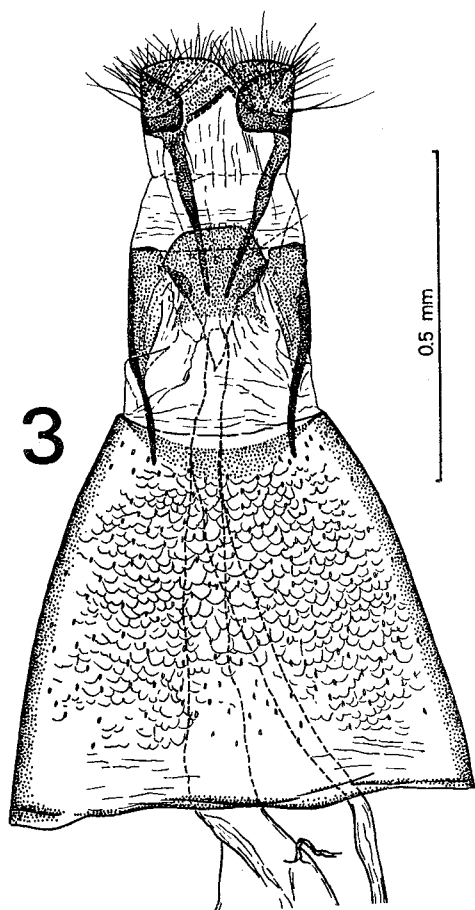
The types are deposited in the Entomological Institute of Hokkaidô University, Sapporo, except for two paratypes in the Department of Entomology, Institute of Agricultural Sciences, Suweon.

Food plant: *Alnus hirsuta* Turczaninov (Betulaceae).

Distribution: Japan (Honsyû).

Mine: A tentiformed blotch-mine occurring upon lower side of leaf, usually situated on space between lateral veins or rarely along leaf-margin, very large, and elliptical in outline. Lower epidermis of the mining part strongly constricted, with five to eight longitudinal wrinkles, as seen in mine of *P. longispinata* (Kumata).

Figs. 1-2. *Phyllonorycter kisoensis*, n. sp. (1) and *P. koreana*, n. sp. (2). 1 and 2: male genitalia (caudal view), apical part of left valva omitted.



Under breeding conditions winter is passed by the pupa within a rather rough cocoon inside the mine-cavity from the end of September to the end of April.

Remarks: This species is closely related to *P. longispinata* (Kumata) which is another leaf-miner associated with *Alnus* spp. in Japan. It is, however, distinguished from the latter by the semicircular dorso-basal mark of the fore wing, the absence of a posterior white dot on the thorax, and the absence of long, thick seta near the base of the valva.

Phyllonorycter koreana, n. sp.

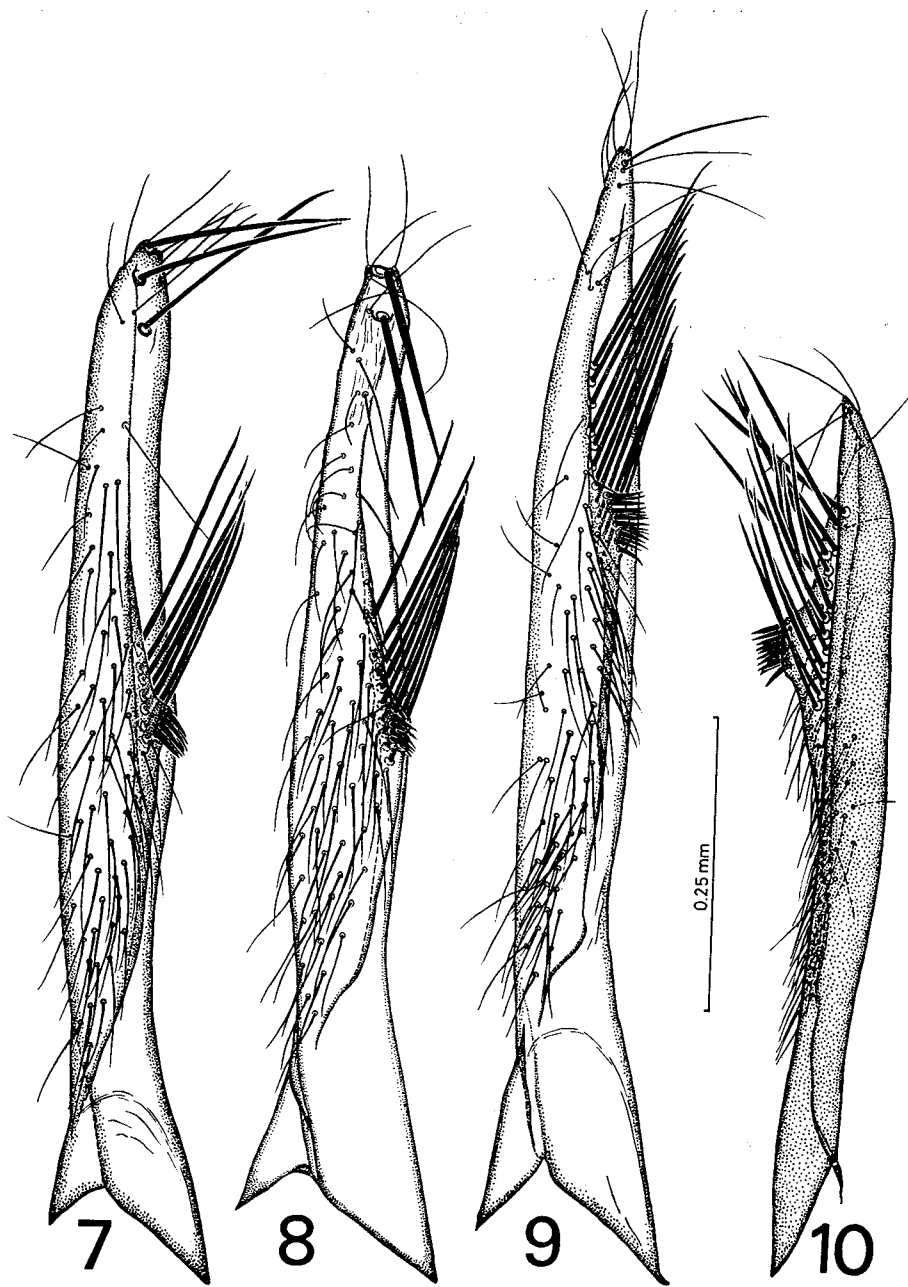
♂ ♀. Expanse of wings: 6.0–7.8 mm. Length of fore wing: 2.8–3.4 mm. (3.2 mm. in holotype).

Colour: Face and palpus shining white; tuft of vertex yellowish wholly. Antenna brownish-fuscon, much darkened apically on each segment except for 9 to 10 apical segments, which are whitish entirely; scape white, very narrowly brownish dorsally, with pecten yellowish-white. Thorax dorsally ochreous-brown with a golden lustre, with 2 narrow white stripes along mesial sides of tegulae; pleural and ventral surfaces shining white. Legs as in preceding species. Fore wing concolorous with dorsum of thorax, with markings silvery-whitish; a longitudinal basal streak nearly parallel with costa, reaching about 1/3 length of wing, entirely narrow, edged with blackish scales on both sides except for basal part; a semicircular dot placed at basal 1/6 of dorsal margin, edged with blackish scales on the side towards base of wing and sometimes also on opposite side; a transverse median band narrow, slightly arched outwardly, narrowly edged with blackish scales internally; three costal strigulae arranged nearly equidistantly on costa between the median band and apex of wing, all edged with blackish scales internally, elongate-triangular or wedge-shaped, the first 2 slightly oblique inwardly; a dorsal strigula placed just basad of tornus, slightly oblique outwardly, edged with blackish scales entirely inside and apically outside; a small whitish spot at middle of termen, surrounded with blackish scales; a blackish dot at apex of wing, round in outline; cilia pale yellowish-gray, slightly darkened inside fringe-line. Hind wing and its cilia gray.

Male genitalia: Symmetrical. Tegumen, saccus and ventral flap as in preceding species. Valva straight, slender, nearly parallel-sided on its basal 2/3 and then gradually narrowed apically in mesial view, swollen inside at apical 2/3 in ventral view; 12 to 15 long, thick setae arranged in a longitudinal row on inner surface from basal 2/3 to 4/5, accompanied with 14 to 17 short, spine-like setae in a clump just basally on the swollen part; many fine setae irregularly scattered at apex and inner surface. Transtilla U-shaped, a little widened in lateral arms. Aedoeagus about 2/3 as long as valva, slender, nearly straight, with an apical barb; juxta weakly sclerotized, striated longitudinally.

Female genitalia: Symmetrical. Papilla analis short, covered with slender setae on entire surface; apophysis posterioris slightly widened on its posterior half, about twice as long as apophysis anterioris. Eighth abdominal segment with 8 setae on caudal margin of tergite; genital plate fan-shaped, situated on ventrum of

Figs. 3–6. *Phyllonorycter kisoensis*, n. sp. (3 and 4) and *P. takagii* (Kumata) (5 and 6). 3: female genitalia (ventral view) — 4: bursa copulatrix — 5 and 6: right valva (mesial view).



Figs. 7-10. *Phyllonorycter kisoensis*, n. sp. (7 and 8) and *P. koreana*, n. sp. (9 and 10).
 7-9: right valva (mesial view) — 10: ditto (ventral view).

8th abdominal segment, densely covered with micro-spines. Ductus bursae slender, membranous; corpus bursae globose; signum sclerotized in an elliptical plate, with a pair of cone-shaped projections at its centre. Seventh abdominal segment rather strongly sclerotized, with an imbricate pattern on



Figs. 11-14. *Phyllonorycter gigas* (Kumata) (11) and *P. longispinata* (Kumata) (12-14).
11-14: right valva (mesial view).

ventral surface.

Material examined: 2 ♂ & 1 ♀. Holotype: ♂ (G. sl. no. Grc-2110), Suweon, Korea, 23/vii/1974, K.-T. Park leg. Paratypes: 1 ♂ & 1 ♀, Suweon, Korea, 10/ix/1973, K.-T. Park leg.

The holotype is preserved in the Entomological Institute of Hokkaidô University, Sapporo, and the paratypes in the Department of Entomology, Institute of Agricultural Sciences, Suweon.

Distribution: Korea.

Food plant and mine: Unknown.

Remarks: This species is very closely related to the preceding *kisoensis*, especially in colour pattern and female genitalia, but differs from the latter in the thick setae on the valva (see Figs. 7–10 and Table 1) and other details.

NOTES ON THE LONGISPINATA-GROUP

The 2 species described above belong to the *longispinata*-group, which was originally erected by Kumata (1963) for 3 Japanese species. So far as based on our knowledge, this species-group is represented by 5 species listed below.

1. *Phyllonorycter longispinata* (Kumata, 1958).
2. *P. takagii* (Kumata, 1963).
3. *P. gigas* (Kumata, 1963).
4. *P. kisoensis* Kumata et Park, n. sp.
5. *P. koreana* Kumata et Park, n. sp.

The *longispinata*-group is characterized by the following combination of the genital characters: – In male, aedoeagus slender on entire length, with an apical or subapical barb; juxta weakly sclerotized, elongate; tuba analis covered with dense micro-spines on sides throughout its length; valva entirely slender or rarely moderate in width, with a group of short, spine-like setae clumped on a raised median area of inner surface, and with long, thick setae arranged in a longitudinal row on inner surface, the setae pointing to ventro-distal direction of valva; saccus triangular, without a prominent distal projection. In female, genital plate situated on ventrum of 8th abdominal segment, fan-shaped or oblong, covered with dense micro-spines almost on entire surface; 8th tergite with some long setae on its caudal margin; 7th abdominal segment normally separated from the 8th by an intersegmental membrane, rather strongly sclerotized, with an imbricate pattern on ventral surface.

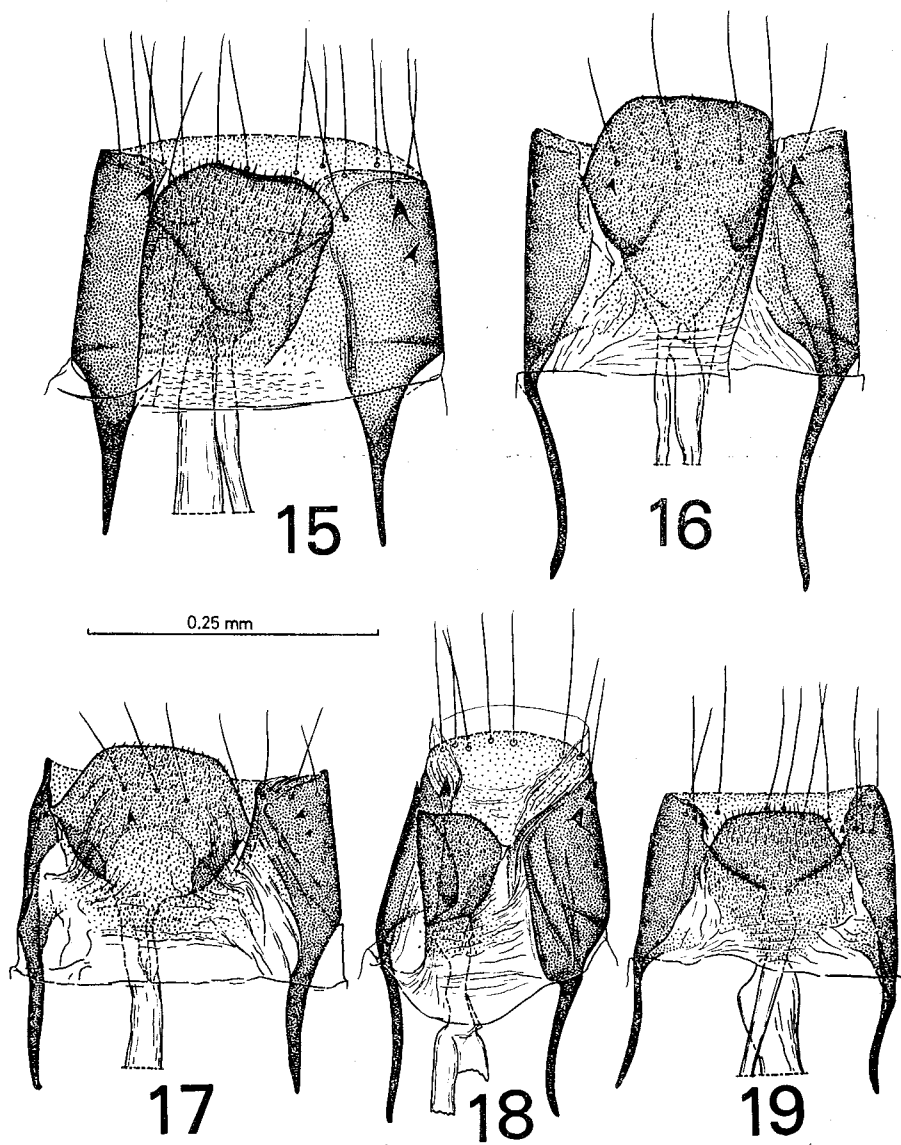
As shown in the map (Fig. 20), the known members of the group are exclusively distributed in the eastern Asia. Except *koreana* and *gigas*, of which the host plant is unknown, they are all associated with the plant-genus *Alnus*.

The group is rather peculiar in structural characters, and its taxonomic relation within the genus is not certain for us. Based on the female genital plate situated on the ventrum of the 8th abdominal segment, it may have an affinity with the *ulicicolella*-group, most members of which are associated with Salicaceae, Leguminosae or Aceraceae. On the contrary, such a relationship is not suggested by the male genitalia at all. In these organs the *longispinata*-group is rather related to the *froeliciella*-group than to the *ulicicolella*-group on account of the sclerotized juxta, the tuba analis which is covered with dense micro-spines, and the valva having long, thick setae. The *froeliciella*-group is represented exclusively by the European species *froeliciella* Zeller; *chrysella* Constant, *nicellii* Stainton, *emberizaepennella* Bouche, etc., the first two of which are leaf-miners of *Alnus*.

This group is rather compact, the members being closely related to one another in the genital structures, especially in the females (see Figs. 15–19). They are, however, subdivided into 2 subgroups by the colour-pattern of the fore wing as follows: –

Subgroup A: Fore wing with 2 transverse bands (one at the subbase and another near the middle), and with a longitudinal basal streak short and sometimes

indistinct. The subgroup comprises 2 species, *takagii* and *gigas*. In spite of this similarity of the colour-pattern, these 2 species are rather distinct from each other in the male genitalia. In *gigas* the valva is very slender throughout the entire



Figs. 15–19. *Phyllonorycter gigas* (Kumata) (15), *P. longispinata* (Kumata) (16), *P. kisoensis*, n. sp. (17), *P. koreana*, n. sp. (18) and *P. takagii* (Kumata) (19). 15–19: eighth abdominal segment of female (ventral view).

length, with a thick, long apical seta (Fig. 11), and the juxta is simple, without spines on the terminal area. In *takagii*, on the other hand, the valva is moderate in width, with a few short, spine-like setae on the top of finger-like projection (Figs. 5 & 6); the juxta has many blunt spines near the terminal area.

Table 1. Number of thick setae on the valvae.

Species	Genital slide no.	I		II		III		IV	
		L	R	L	R	L	R	L	R
<i>koreana</i>	Grc-2110	0	0	14	12	0	0	17	17
	668 (JAS)	0	0	13	15	0	0	15	14
<i>kisoensis</i>	Grc-2143	0	0	5	7	2	3	10	10
	Grc-2154	0	0	5	5	1	2	10	9
	Grc-2160	0	0	6	8	2	2	12	11
	Grc-2140	0	0	5	7	2	2	10	11
	Grc-2026	0	0	10	9	2	2	9	12
<i>longispinata</i>	Grc-275	1	1	3	4	2	2	13	12
	Grc-277	1	1	4	6	2	2	17	16
	Grc-2052	1	1	5	3	2	2	13	12
	Grc-2051	1	1	2	1	2	1	10	10
<i>gigas</i> <i>takagii</i>	Grc-40	0	0	2	3	1	1	9	7
	Grc-179	0	0	3	3	0	0	2	2
	Grc-109	0	0	3	2	0	0	3	3
	Grc-182	0	0	3	4	0	0	4	4

I: long subbasal setae; II: long median setae; III: long apical or subapical setae; IV: short median setae. L: left valva; R: right valva.

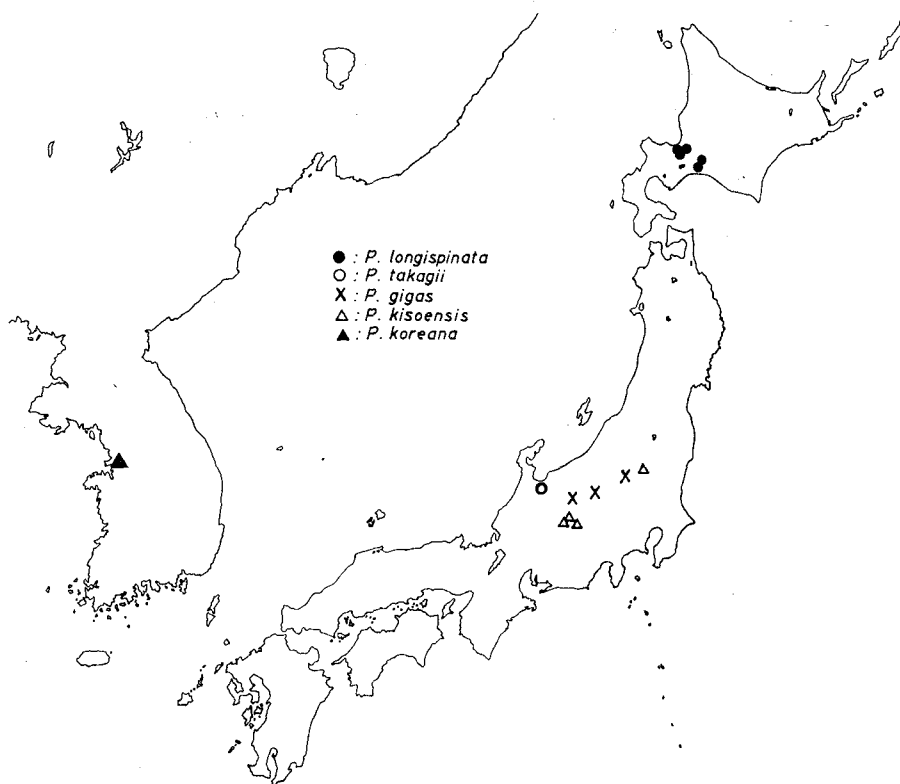


Fig. 20. Distribution of the species belonging to the *longispinata*-group of the genus *Phyllonorycter*.

Subgroup B: Fore wing with 1 transverse band near middle, and with 1 longitudinal basal streak, which nearly occupies the basal 1/3 of the wing-length. The remaining members, *longispinata*, *kisoensis* and *koreana*, are included in this subgroup. They are quite close in the male genitalia, being distinguished merely by the arrangement of the thick setae on the valva as shown in Table 1 and Figs. 7-12. At the same time, this comparison suggests that *koreana* and *kisoensis* are more closely related to each other and rather isolated from *longispinata* in lacking a thick and long seta near the base of the valva.

Up to the present, our collecting localities are very few, and our knowledge on the distribution of the species is quite limited. It is, however, noteworthy that the members of the subgroup B, which appear very closely related as stated above, are allopatric in distribution: *koreana* is known from Korea, *kisoensis* from Central Honsyû, and *longispinata* from Hokkaidô. On the other hand, *kisoensis*, *takagii* and *gigas* are nearly sympatric in Central Honsyû, and appear remotely related taxonomically. These species may also differ in food preference: *takagii* was reared from *Alnus japonica*, while *kisoensis* from *Alnus hirsuta*. The host plant of *gigas* is unknown, but it should be mentioned that the genus *Alnus* is rich in species in Central Honsyû. It may, therefore, be possible that these sympatric species of alder-feeders are displaced among different species of *Alnus*.

KEY TO THE SPECIES OF THE LONGISPINATA-GROUP

1. Fore wing with 2 transverse, whitish bands besides costal and dorsal strigulae, the first band at basal 1/4 and the second near middle of wing. 2
- Fore wing with 1 transverse, whitish band near middle of wing besides costal and dorsal strigulae. 3
2. Markings of fore wing silvery-whitish; a small, blackish dot at base of costa of fore wing; valva moderate in width, about 3.5 times as long as wide in widest part, with 2-4 short, spine-like setae on top of finger-like projection (Figs. 5 & 6); juxta with blunt spines near terminal area. Food plant: *Alnus japonica*. Distribution: Central Honsyû, Japan. *P. takagii* (Kumata)
- Fore wing with whitish markings, without any blackish mark at base of costa; valva slender on almost entire length, about 10 times as long as wide, with a long, thick seta at apex and with 7-9 short spine-like setae near apical 1/3 on inner surface; juxta simple, without any spines. Food plant: unknown. Distribution: Central Honsyû. *P. gigas* (Kumata)
3. Fore wing with a longitudinal streak on the base of dorsal margin, the streak being a little shorter than a longitudinal medio-basal streak; valva with a long, thick seta near base (Figs. 12-14). Food plant: mainly *Alnus japonica* and occasionally *A. hirsuta*. Distribution: Hokkaidô, Japan. *P. longispinata* (Kumata)
- Fore wing with a semicircular dot near base of dorsal margin; valva without a subbasal seta. 4
4. Valva with 14-17 short, spine-like setae at basal 2/3 of valva and 12-15 long, thick setae arranged in a longitudinal row on inner surface from basal 2/3 to 4/5 (Figs. 9 & 10). Food plant: unknown. Distribution: Korea. *P. koreana* Kumata et Park
- Valva with 9-12 short, spine-like setae at middle of valva, 5-10 long, thick setae arranged in a row on inner surface near middle, and 1-3 similar setae near apex (Figs. 7 & 8). Food plant: *Alnus hirsuta*. Distribution: Central Honsyû. *P. kisoensis* Kumata et Park

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